

Editorial: B. F. Skinner and His Contingencies

Before me is the book *Contingencies of Reinforcement* by Skinner, and in my mind is the picture of Skinner, the 20th Century American philosopher-psychologist-essayist. Skinner, more than any other American, has brought into focus what can be learned and expected from a study of the external environment and the individual. He has done this with clarity, with honesty, and with a close contact with the times in which he lives. His philosophy is of this era. But his outlook, given his premises and conclusions, is the most optimistic that is perhaps possible based on the obvious relationship of the individual to the external environment. His brave new world is not for him the bleak one forecast by Aldous Huxley, nor that shouted by the "hippie."

Skinner as a young man aspired to be a writer, but he gave up this idea because, as he stated it, he had nothing to say. From his many books it is clear that Skinner has had a good deal to say, and that he also has the ability to say it. Further evidence of this ability is his several forays into literature, e.g., his dialogues with Whitehead and his *Walden II*. His writing has a literary finish and it is written with clarity—when the subjects are capable of clarification. He is familiar with the classics and history and the subjects on which he is writing.

Contingencies of Reinforcement is a compilation of his sporadic lectures from 1960–1969.¹ They are chosen to give a sense of contiguity and a comprehensiveness to his point of view about psychology and its philosophical implications.

Naturally his point of view is that of "Operant Conditioning" of which he is the developer, if not the creator. Skinner has performed a great service to psychology and also to the science of the mind by devoting his attention to what can be measured and not confusing the measurable with the unmeasurable. He has been criticized for being superficial, but this emphasis has been necessary in a subject which has been so involved in confusion and theories. It has also paid off in providing a method for psychology in its application to other fields, e.g., the teaching machine. The Skinner box is such a promising tool of the operant psychologists that it has been included in Webster's Dictionary.

Skinner may be too sensitive to the criticism that he makes no theories, for he argues against this view. But his great advantage is his avoidance of unwarranted and profuse theories that beset psychology and psychiatry. For theory he substitutes technique and utilitarianism.

Skinner avoids many of the pitfalls of the lesser prophets of the era. Notably he does not range over the physical universe to find analogies in foreign sciences—field theory, vectors, dynamics, etc.

¹ B. F. Skinner: *Contingencies of Reinforcement*. New York, Appleton-Century-Crofts, 1969.

Unfortunately the publisher, in an attempt to mold the chapters into the form of a new book, has omitted dates and places, an important item in the history of a person. However, these can be traced by referring to a separate section at the end of the book.

The selection of his lectures for reprinting is gathered under three headings: Contingencies of Reinforcement and the Design of Cultures, An Analysis of Ontogenic and Phylogenic Contingencies, and A Critique of Alternative Theories. The fact that these are a collection of lectures keeps them from being a systematic survey of his work, but in spite of this they read smoothly, give information on many topics of operant conditioning, and present his philosophy.

Skinner is the successor in American psychology to John B. Watson. Watson believed and attempted to show experimentally that through the external environment a young individual could be molded into any form the experimenter desired—"rich-man, poor-man, beggar-man, thief."

Watson and Skinner have important differences. Although both were influenced by Pavlov, Watson was more closely concerned with the visceral events. In 1916 he postulated a cardiac conditional reflex, but owing to lack of proper instruments, could not demonstrate it. Positive proof of a cardiac conditional reflex did not come until 1939. Skinner, conscious of the pitfalls of theories based on what could not be assessed, rigorously avoided what was too uncertain or too difficult to measure. When I asked him a score of years ago if he thought there would be a cardiac change with the conditional reflex, he replied he did not know. Previously he stated:

"There is little reason to expect conditioning of Type R in an autonomic response, since it does not as a rule naturally act upon the environment in any way that will produce a reinforcement, but it may do so through an instrumental means. I have attempted to condition vasoconstriction of the arm in human subjects by making a positive reinforcement depend upon constriction. These experiments have so far yielded no conclusive result, but there are many clinical results that indicate [cardiac conditioning]."²

Skinner has defended his lack of preoccupation and work with what goes on inside the organism with the difficulty of such measurements during the years of his research.

The role of the external environment dominates not only psychology, but the structure of our society. This emphasis has accelerated since John Locke described his view of the person as a *tabula rasa*. American psychology adheres to the doctrine of Locke concerning the sensory impulses as determining behavior, and it shares the optimisms of Helvetius (1715-1771) and Condorcet (1743-1794). Watson, who professed you could make a person anything you desired through conditioning from infancy, is a strict follower of Helvetius, who said that through education an individual could become an idiot or genius. Skinner, though much more subtle and discreet, seems to be of the same school.

Skinner and His Successors

EDITORIAL

Volume 5
Number 2

American psychology, in conformity with American philosophy, has been characterized by its emphasis on the practical applications. Concerning the methodology, there have recently been attempts to divide conditioning into schools—Pavlovian and operant (more properly Skinnerian). The division is often artificial; Pavlov used what might be considered operant in that the animal did something to obtain the stimulus. However, there is a fundamental difference in that Pavlov rigidly adhered to a distinction between what was inborn (unconditional reflex) and what was acquired (conditional reflex), while Skinner uses as a “reinforcer” whatever makes the animal respond. (Pavlov defines the term “reinforcer” strictly to mean the unconditional stimulus when it follows the CS.)

In the past few years since the possibility of forming cardiac conditional reflexes has become widely known and popular, the division has attracted the special attention and interest of some American psychologists. Seeing the potentialities of using Skinner’s operant methods with Pavlov’s demonstrated conditionability of the autonomic system, they have reported control of the cardiovascular system and of the kidney, and have predicted almost universal regulation of visceral functions.

These excessive claims may lead to false hopes and produce the same kind of damage to this research field as did the excessive claims of John B. Watson. It may, however, have a positive value in stimulating others to repeat their work, as Newton is now doing in the VA Hospital at North Little Rock, Arkansas.

As an example of one of the fallacies of the Miller school is the prediction of the control of anxiety and grand mal epilepsy through operant conditioning. As I pointed out in discussion when this prediction was made, such control was extremely doubtful because as the epileptic has cues (aura) just before the attack, the disagreeable effect of the fit would be more potent in eliminating the attack than would any small operant reinforcers that could be introduced.

Here we have an example of the importance of a knowledge of physiology in working with conditional reflexes of the autonomic system. If one were familiar with the distinction between conditional reflexes and unconditional reflexes and with grand mal epilepsy, one would know that the epileptic convulsion is an unconditional reflex and therefore not extinguishable as are the conditional reflexes.

Although Skinner himself does not make this distinction between conditional and unconditional reflex, he would not have fallen into this error, first because of his adherence to facts, second due to his lack of exaggeration, and third because he worked very little with the autonomic system.

It is unfortunate that medicine, to some extent, is too ready to accept popular opinion rather than scientific and critical evaluation. “The medical profession itself has little or no direct knowl-

edge of the physiology of the conditional reflex and its applications to medicine and therapy, but physicians get their feedback from psychologists rather than from those few physiologists who work with visceral changes in the conditional reflex" (Perez-Cruet, personal communication).

This statement is borne out by most physiological texts today. The teaching in the United States is mostly traditional American operant psychological rather than Pavlovian. While the older texts, viz., Bayliss, Starling, Howell, Wiggers, Bard, Best and Taylor, contained considerable material on the laws of the conditional reflexes, in the newer texts the material is omitted. A noteworthy exception is the section by Orville Smith in the new revision of Fulton.

Psychiatry depends chiefly on the research of the modern psychologist rather than on that of their own profession, most of whom do little basic research in behavior. But psychiatry has to be careful to distinguish between what is a solid contribution from another discipline with which they are unfamiliar and what is gross exaggeration from those who profess to cure or modify all psychosomatic maladies.

Skinner and Pavlov

Several important differences exist between the bases of Skinnerian and Pavlovian teachings.

1. Skinner with his stimulus and response, independent and dependent variables, contingencies and reinforcers, does not take into account the nature of stimulus and response. He states:

No matter how important genetic variables may be, we do not manipulate them as such in predicting and controlling the behavior of a given organism.⁸

Pavlov, on the other hand, was careful in this distinction. He upbraided the Bolsheviki in the 1920's for claiming they could perform changes through education of certain traits. He often used US as conditional stimuli, *e.g.*, faradic shock, but he recognized it was a US and stated that it would act as a CS only if it was not too strong.

2. Pavlov admitted individual differences when he saw that all dogs did not react similarly to the same stimulus, and he postulated four types. This was an outgrowth of the chronic experiment, the prolonged study of a single individual. He tended to think that these differences were inborn when he spoke of the guarding type or watchdog. I do not find a statement from Skinner defining his own position here.

3. Pavlov and Skinner both assert the importance of objectivity. But I think Pavlov asserts it as a method and that Skinner ascribes much less importance to the subjective. Skinner says, "Whether feelings are causes may also be asked with respect to external variables. Is massage reinforcing because it *feels* good?"

About feelings and actions (verbal or others) Skinner seems very positive:

In telling us about his feelings, [the subject] reports information which is useful to us but hitherto available to him alone. Nevertheless, it is not his feelings which are important but the conditions he feels. In the early days of research on LSD, it was seriously argued that all psychiatrists should take the drug in order to see how it feels to be psychotic.

Most psychiatrists would disagree with Skinner here.

If one is not yet convinced of Skinner's point of view, let him read further:

We recognize that what is to be treated is the condition felt and not the feeling. . . . Young people are said to get into trouble when they do not "feel wanted," but it is not the lack of a feeling but the lack of the contingencies which would generate it which causes trouble.

If we need other examples of this view, we do not have long to wait:

We cannot make men stop killing each other by changing their feelings; we must change the environment.

Another example of the role of the subjective can be found in Voltaire's *Candide*:

She, not thinking any harm, *took hold of his hand*; and the young man, not thinking any harm either, *kissed the hand of the young lady* with an eagerness, a sensibility and grace, very particular; *their lips met, their eyes sparkled, their knees trembled, their hands strayed . . .*

The objective description of these movements would have little significance did they not "light up" certain of our own subjective feelings. The movements are the valuta of the scientist, universal; the subjective feelings, private property, and poorly if at all communicable. The objective statements, in my italics, borrow their values from the subjective connotations.

Pavlov, judging by my conversations with him and by a few passages from his *Lectures on Conditioned Reflexes* (1927), did not belittle the subjective, but considered subjective descriptions improper means of scientific communication:

"Only one thing in life is of interest for us—our psychical experience. Its mechanism, however, has been and remains a deep mystery. All human resources—art, religion, literature, philosophy, historical science—all these unite to cast a beam of light into this mysterious darkness. Man has at his disposal one more powerful ally—biological science with its strictly objective methods."⁴

Skinner and Pavlov both believed in a finite universe accessible and comprehensible to science.

If I may be allowed to surmise as to Skinner's position in philosophy, I would say that he occupies a place close to that of Bertrand Russell. Russell believed in a finite and ultimately comprehensible universe. He states that at some future period all the pertinent knowledge concerning the whole universe can be recorded on something like a tape and that thereafter the future for research and thought will be uninteresting. Russell is a strict, though tolerant, materialist with little of the "believing where we cannot prove."

"It is thought that the universe is of finite extent . . . matter consists of electrons and protons which are of finite size and of which there are a finite number. . . . Physical science is thus

⁴ Skinner, *op. cit.*, p. 87.

approaching the stage when it will be complete, and therefore uninteresting. Given the laws governing the motions of electrons and protons the rest is merely geography" (from "What I Believe," written in 1925). Unfortunately what Russell believed, before they reached the threshold of bodily movements observable externally, was enough to cause his expulsion from City College, N. Y., as unfit to teach. Skinner would have been a more tolerant judge because he would not condemn until he saw the external acts.

Between what Pavlov states about the importance of the subjective and what Skinner says, there is a great disparity. Although Skinner agrees with me that there are overlaps with Pavlovian conditioning, there are important differences. Skinner is not concerned with whether the responses are unconditional reflexes or acquired, whether the reinforcer is an unconditional stimulus or not. Here Skinner conforms to the American and current philosophy—"Does it work?" Although many of Pavlov's followers, *e.g.*, Ivanov-Smolensky, and the school of Bekhterev, have used in the place of the unconditional stimulus what actually reinforced the previous motor response, Pavlov adhered to the pattern indifferent stimulus plus unconditional stimulus, *viz.*, a stimulus which produced a set response without training.

Although Darwin was the great iconoclast of the older beliefs and traditions of the 19th Century, he gave an impetus to the external environmentalists. It is curious to note how one of his basic tenets has been almost completely overlooked. The crux of his "struggle for existence and survival of the fit" was the importance of *individual* differences in giving superiority to those possessing some advantage. All may be born free but they are not born equal. Although the principle of inequality is essentially anti-democratic and anti-Marxist, Darwin's name is revered in Soviet Russia and inscribed along with Marx' and Engels' on granite stones of the Lenin Library in Moscow.

And Darwin's principle of the importance of individual differences has had little effect on the mental science of the western world.

Pavlov, on the other hand, seeing the inability of exploring behavior by the external environment alone, recognized the principle of individual differences by dividing his animals into "types." But types, being determined with difficulty, do not lend themselves in a hurry to a discipline to get results. This is one reason for the dichotomy between Pavlov and most other behaviorists.

Skinner and Religion

In "Science and Human Behavior," 1953, Skinner's reduction of religion to contingencies has the same validity as the reduction of thoughts to drops of saliva: they cannot be compared any more

than a cow resembles a dollar. Contrasting Skinner with William James here—*e.g.*, James' "Will to Believe"—the latter strikes at that part of religion which, as Pavlov says, makes "life easier and happier," while Skinner measures religion according to external manifestation like drops of saliva. This view, unlike that of James, leaves you cold.

EDITORIAL

Volume 5
Number 2

The chief truth that I derived from Skinner's discussion of religion was a side issue—his astute observation that "a single pairing of stimuli could result in a conditional reflex," and "in operant conditioning a single instance of a response which is followed by a reinforcing event . . . the effect may survive for a long time even though the same consequence never occurs again. Verbal behavior is especially likely to show this kind of 'magic'." What Skinner is saying here is equivalent to one of our basic principles derived from experimentation, *viz.*, *one-trial conditioning* (Newton, 1966)* and *schizokinesis*, *viz.*, that cardiac conditional reflexes may be formed and persist for years after one reinforcement. It is interesting how often the observation of a great mind is the forerunner of what is later confirmed by experimentation.

A Creed for the Modern Scientist

The universe to me is more than the human brain which comprehends an aspect of it. As the eye can detect only a small proportion of electromagnetic wave lengths, our mental capacity can fathom only an aspect of the universe. Compared to this human capacity I believe that the physical universe is infinite.

Not only our concepts of it, but the limits of the extent to which we can deal with it pragmatically expand with the developments of the human brain and what has been stored by virtue of the second-signalling system. In any given era this must be our real pragmatic universe, the one with which we can act and interact. But we must recognize this universe as a relative one—relative to the human brain in the year 1970 and only an aspect of another universe that lies beyond and awaits discovery by a future Newton, Darwin, or Pavlov brain. Any number of lesser and ordinary brains cannot equate with the concepts of the Einstein-Planck-Bohr-Pavlov brain.

When I say that the universe is infinite and illimitable, I recognize that there is a definite, finite, and pragmatic world for each individual. It is the present world that one can work with today. For the dog his pragmatic world is one of olfactory stimuli, and scents, of sounds and sights leading to rabbits, to foes, to friends. The moon is a luminous body, but was not an object in space to be traversed until in 1969 the pragmatic world provided the fuels, gravitational balances, etc. And this pragmatic world, though relatively stable for the dog, is at every instant and era

* Newton, J. E. O., and Gantt, W. H.: One Trial Cardiac Conditioning in Dogs. *Cond. Reflex*, 1(4):251-255, 1966.

changing and expanding for the human, according to the function of this millenium's cerebral substance to initiate a constant resonance between observed facts and the concepts they generate, and their storage depots, involving the second signalling system of Pavlov and the developing interactions of autokinesis.

Beyond the physical universe, according to my comprehension, there is a mental world which never can be adequately recorded; the nearest we come to it is in our subjective thinking and feelings. Whatever God there be, owing to His greater complexity compared to the most complex thing that we know, *viz.*, the human brain, is incomprehensible from the standpoint of this inferior human brain, just as a creature in a two dimensional world is unable to comprehend the movement of a creature into the three dimensional world, the three-dimensional person, the world of the four-dimensional creature, etc.

Our subjective concepts and reasoning not only divine truth—usually parallel to the truth that our sense organs and experience reveal—but they create our pragmatic universe. Newton's laws actually create a new universe; they have created lunar vehicles that can annihilate space that was impenetrable. Einstein and the atomic physicists demonstrate the "magic" of the conversion of the subjective into concrete objective forces. We actually witness the faith that makes it possible to move mountains. Here is interaction of the subjective with the objective. Reality is constituted from both.

But if the universe that we know is created partly by the concepts of a particular brain, is not the potential universe incomparably greater and different and dependent on this brain, because it is made of its concepts? The energy of the universe and its forms are redirected, e.g., into space-ships, hydrogen bombs, disappearance of diseases and species.

The universe is admittedly more than the part that the particular brain knows—in 1970. Each living cell, moreover, can interact with some part of the universe. Each organism perceives only an extremely circumscribed part of the real universe. The ability to interact with this limited part and the lack of vision gives the illusion of knowing it all. Subsequently, by an evolving perceptive organ, by subjective and scientific concepts, a new horizon is revealed and the old universe shrinks and shrivels like a discarded skin.

There is admittedly the point of view of relativity, that what the human brain comprehends must be taken as ultimate truth, because his is the only truth we know. But this ultimate truth is continually changing as a greater genius enlarges the horizons. Even for science alone it seems important that we admit an infinite. Only then can we transcend what is now the limitable.

Skinner and I stand on the same ground in what I consider the province of science. It is my opinion that science must deal only with the objective, what is communicable, what is measurable. One "knows" (infers) the feelings of hunger, anger, etc.; in others,

man or animal, only through movements (including speech), secretions, electrical impulses, etc., are inferred. Therefore it is more accurate to say what these objective records are and then to assert that what we have measured is summed up in the word hunger, anger, etc., than to speak vaguely of an emotion which we can recognize only by these measurements. Later we can equate these movements with what we call that emotion as we experience it ourselves. But I know directly this feeling in myself, and I consider this subjective world different from the objective world that can be measured. The subjective we feel, but the feeling of red is different from its measured wave length. We can identify with another person the objective red, but not the feeling red.

EDITORIAL

Volume 5
Number 2

Skinner and Bertrand Russell, perhaps Pavlov, differ from the romantic poets—though Skinner is a musician and Pavlov loved opera and classical music. The behaviorist has no place for “thoughts hardly to be packed into a narrow act,” nor “fancies that broke through language and escaped.” “All that I could never be, all that men ignored in me, this I was worth to God,”—but not to the behaviorist.

Skinner says about Newton, “The ideas he did not *quite* express were not the causes of the ideas he expressed.” Here I differ.

Philosophers and the savants lead the parade for the succeeding organizations. The mob, jockeying for position, follows pell mell. Francis Bacon, ushering in the era of experimental science three centuries ago, wrote, “Knowledge is power.” He appended: “Science being the wonder of the ignorant and unskillful may be not absurdly called a monster.”

Now we, impressed with the misuse as well as the use of this power, begin to ask, “Power for what?” The scientific geniuses who have implemented much of the new science in physics have begun to question the worth of their scientific goals. Einstein, toward the end of his life, it is said, admitted that if had his life to relive he would not go into science.

With this frustration, and with the philosophy springing from the symbolisms of science at the limits of matter and energy and the merging of the objective into the subjective, the great scientists are beginning to recognize the importance of the subjective. Max Born asserts in his autobiography:

In 1921 I believed, . . . that science produced an objective knowledge of the world, which is governed by deterministic laws. The scientific method seemed to me superior to other, more subjective ways of forming a picture of the world—philosophy, poetry, and religion; and I even thought the unambiguous language of science to be a step toward a better understanding between human beings.

[By the 1950s, however,] I believed none of these things. The border between object and subject had been blurred, deterministic laws had been replaced by statistical ones, . . . I now regard my former belief in the superiority of science over other forms of human thought and behavior as a self-deception due to youthful enthusiasm. . . .¹

¹ Born, Max: *Physics in My Generation*, Ed. 2, New York, Springer-Verlag, 1969.

Aside from these lamentations it may be that specific sciences have their natural life course. Dos Passos says apropos of the environmentalists:

It seems to me that what has happened is that the entire ideology that springs from John Locke and the French encyclopaedists has reached maturity and died. Ideas have their lifespan like natural organisms. To my mind the importance of Pavlov rests chiefly on his dedication to objective reporting which left him no time to fuss with fashionable ideologies.²

The sense of awe, the mystery of the universe is expressed more often by the physicists than by the modern psychologists and biologists. "There was the door to which I found no key; there was the veil through which I might not see," could not have been said by either Russell or Skinner, but the great physicist of the 20th Century, Einstein, goes even a step further when he proclaims:

The most beautiful and most profound emotion we can experience is the sensation of the mystical. It is the source of all true science. He to whom this emotion is a stranger, who can no longer stand rapt in awe, is as good as dead. That deeply emotional conviction of the presence of a superior reasoning power, which is revealed in the incomprehensible universe, forms my idea of God.

Sherrington, in *Man on His Nature*, makes a similar statement about the role of awe in science:

We dismiss wonder commonly with childhood. Much later it may return. Then the whole world becomes wonderful. . . . To recapture now and then childhood's wonder is a driving force for occasional grownup thoughts. (*Man on His Nature*. New York, Mentor, p. 94.)

I allow myself now the liberty of diverging into an hypothesis. The sense organs can record close to the limit of what we recognize theoretically as the ultimate physiological limit—the eye a few quanta, the ear the vibration of one or two molecules, the olfactory organ of some organisms (silkworm) *one* molecule. These quantities are ultimate physical units, and the corresponding sense organ is in this respect more sensitive than any physical instrument yet built. It is certainly conceivable, though not proven theoretically nor demonstrated experimentally, that thoughts may be even below this threshold of one quantum, and if so the thinking process may be too small for any instrument *ever* to record. That is, the subjective world which we experience can neither be measured nor recorded completely, nor communicated adequately; we may measure only the objective correlates, and for some thoughts there may be no objective correlates. I am willing to state this opinion, deduced from our world of physical instruments, at the risk of being branded as dualistic.

There is another consideration from the point of view of energy consumed and subjective output. The quantity of glucose and oxygen consumed, *viz.*, the total energy used by the brain, is approximately equal during sleep and during mental work, roughly equal for the gorilla and for man per unit weight of brain. Therefore, the amount of measurable physical energy transformed into con-

cepts is infinitesimal compared with their physical effects on the universe. Can the subjective cause at its minimal level ever be recorded by physical instruments?

EDITORIAL

Volume 5
Number 2

Thus that part of my world about which I am the most certain, the subjective, is my private world and no one has the "Open Sesame." Who can describe to another the pain of a toothache? I know it in another only through two mechanisms: 1. Through my sense organs I have formed conditional reflexes to the movements, the actions of another to a recognized gesture, a smile, and so on. 2. I know his subjective state through inference, the ability of my brain to arrive at and recognize truth, the way I know that three angles of a triangle add up to 180 degrees without ever measuring the angles, and independently of conditional reflexes.

Fred, if I understand you correctly, you and I agree on what data science should deal with, and we have similar ideas about the value and place of theory. It is my opinion that our musings differ on the following: For you everything either now or in the future can be brought within the scope of science. But I look on science as capable both now and in the future of dealing with only part of the world that we know. The world that science concerns itself with is limited by the scientific method. Since science is a product of the human brain, and the human brain only is in its first stage of evolution, this science will change as the brain evolves. It will even change during the years that we live and view it because of the change in instruments, etc. There is a world beyond science of which we catch glimpses, but it is also a real universe. Part of this other universe is our subjective life. Science can represent the subjective life only on the level of its material correlate. But the part of us that recognizes and judges the truth of this correlated material also recognizes subjective feelings, *e.g.*, the color of red which cannot be duplicated anywhere else than as a subjective feeling.

There is, I think, more than a battle of words here. Recognition of the limits of science keeps us alert for new perspectives as it assesses the relativity and evanescent character of science. It also gives validity and acceptance to that part of our life which we, all of us, tacitly admit.

CONCLUSIONS

Skinner, like many wise men, has a sense of the dramatic; he knows what his audience wants. However, this does not diminish or interfere with the contribution of his work, nor the clarity of his presentation. He stands apart from those Johnny-come-latelies who have run profitable sideshows in animal training if they do not get under the main tent. Many of his followers, waving the operant flag and rushing in "where angels fear to tread," remind one of the intoxicated drunk who exclaims, "The ocean is only knee deep!"

If Skinner has provided tally-ho for the bandwagon researchers, he certainly is not the driver of the movement. He stands head and shoulders above the mob of entrepreneurs who wave his flag.

He occupies a place in the history of American psychology with the foremost—John B. Watson and perhaps William James. Compared with Watson, he is more farsighted and scholarly, and though having created a movement which will perhaps lead to more serious errors than Watson's (because they are less obvious), he has not

succumbed to it himself; he cannot be held responsible for all the mistakes of those who use his method.

Skinner has shunned all those allurements of the get-rich-quick schemes of those who, with almost no knowledge of physiology, and often with no knowledge of scientific method, strive for cheap publicity by claiming to control and understand all visceral responses by a combination of Pavlovian and Skinnerian methods. The public is now in danger of being sold on the complete control of cardiac, renal and other functions—a wholesale, shot-gun therapy.

It is against this background that we see Skinner as a wise man and a giant among his confrères. For Skinner possesses a proven method of modifying motor behavior. Yet with this power he has resisted what must have been a temptation to claim more than was justifiable, especially as he saw those who were not only far less capable, but who were the Barnums of the arena walking away with the show and winning the applause.

However, Skinner will have the satisfaction of seeing that his place in the history of psychology, though limited to the external environment and motor behavior, is firmly established, while those self-styled visceral doctors will, within the decade, be revealed for what they are.

The institutes built upon the teachings of their great prophets—Galileo, Darwin, and Pavlov—promptly crucify or pervert the prophet and then are free to organize for power. With the flag-waving operant conditioners, this is happening to Skinner. Is Skinner amused, slightly pleased by the carrousel marked “Skinner”—or does he sense the travesty of the deviation from his Puritanical adherence to facts? “Protect me from my friends, I will protect myself from my enemies.”

Although from this book Skinner emerges as an unequivocal materialist, he is not a militant one. He states in the chapter entitled “The Inside Story” that “man is a machine, but he is a very complex one. At present he is far beyond the powers of men to construct—except, of course, in the *usual biological way*.” No conceivable machine would detect the full meaning of the last three words (my italics) because of this hidden humor, and machines do not display humor, and they have nothing to hide.

He recognizes that much lies undiscovered and cannot presently be explained by the machine, but he believes that behavior ultimately is solely determined by scientific principles. I am of the opinion that he thinks there is nothing beyond science in the mental life, as well as in behavior. However, he is far too clever to think that computers and automation can be made equivalent to human beings.

From this series of lectures it is evident that Skinner is a writer, a scholar, something of a philosopher, and a foremost and worthy psychologist of the 20th Century.

— W. HORSLEY GANTT

Pavlovian Laboratory, VA Hospital, Perry Point, Md.